

WHAT IS CLAIMED IS:

1. A device for applying tethered clips to an annulus, the device comprising:  
a shaft having a proximal end and a distal end;  
a plurality of clips slidably coupled to a tether, the tethered clips delivered by the shaft;  
a clip applier at or near the distal end of the shaft for securing the clips to the annulus; and  
at least one actuator at or near the proximal end of the shaft for causing the device to advance the clips and for activating the clip applier to secure the clips to the annulus.
2. A device as in claim 1, wherein the clip applier comprises:  
a pusher coupled with the actuator for advancing the clips; and  
at least one slot in an inner surface of the shaft for guiding the clips.
3. A device as in claim 2, wherein the clip applier further comprises a clip crimping member.
4. A device as in claim 3, wherein the at least one actuator includes means for cinching the tethered clips to reduce the circumference of the valve annulus.
5. A device as in claim 1, wherein the at least one actuator is selected from the group consisting of a trigger, a handle, a plunger, a squeeze-activated device, a syringe-grip device and a foot-operated device.
6. A device as in claim 1, wherein each of the plurality of clips includes at least one eyelet, and the tether passes through the at least one eyelet of each clip.
7. A device as in claim 6, wherein each of the plurality of clips includes two eyelets, and the tether has parallel segments passing through both eyelets of each clip.
8. A device as in claim 6, further comprising means for crimping the at least one eyelet of any of the plurality of clips such that a clip with a crimped eyelet is secured to the tether.

9. A device as in claim 1, wherein the shaft comprises an elongate, hand-held shaft.

10. A device as in claim 1, wherein the shaft is introducible into a patient through a minimally invasive incision.

11. A device as in claim 1, further comprising a tether anchor coupled to the tether and carried by the shaft.

12. A device as in claim 11, wherein the tether anchor comprises a rivet.

13. A device as in claim 11, wherein the tether anchor is coupled with at least a last clip of the tethered clips such that crimping the last clip secures the last clip to the tether anchor and the tether anchor to the tether.

14. A device as in claim 13, wherein the tether anchor is further coupled with a penultimate clip, such that crimping the penultimate clip secures the penultimate clip to the tether anchor and the tether anchor to the tether.

15. A device as in claim 1, wherein the tether is selected from the group consisting of a suture material, a Teflon strip, a band, a filament, a wire and a strap.

16. A device for applying tethered clips to an annulus, the device comprising:

a shaft having a proximal end and a distal end,

a tether having at least two parallel segments;

a plurality of clips which slidably receive both segments of the tether, wherein said clips are arranged successively on said tether, and

a clip applier at or near the distal end of the shaft for securing clips to the annulus while said clips remain on said tether.

17. A device as in claim 16, wherein the clips each include a pair of spaced-apart eyelets, wherein one segment is received in each eyelet of the pair.

18. A device as in claim 17, wherein the clips are deformable in the region of the eyelets to permit crimping.

19. An annular fastener comprising:  
a tether comprising a pair of parallel segments, and  
a plurality of clips which each include a pair of spaced-apart eyelets, wherein  
one ether segment is received in each of the eyelets on each clip.
20. An annular fastener as in claim 19, further comprising a terminal clip  
which is fixed to a leading end of the tether.
21. An annular fastener as in claim 19, wherein the plurality of clips  
includes at least two clips.
22. An annular fastener as in claim 19, wherein the clips are deformable in  
the region of the eyelets to permit crimping.
23. A system comprising:  
a device as in claim 1; and  
a stabilization device adapted to capture and immobilize the annulus.
24. A system as in claim 23, wherein the stabilization device comprises a  
pair of rings which are adapted to clamp opposed faces of the annular surface.
25. A system as in claim 24, wherein the device is adapted to clamp over  
and under a heart valve annulus.
26. A system comprising:  
a device as in claim 16, and  
a stabilization device adapted to capture and immobilize the annulus.
27. A system as in claim 26, wherein the stabilization device comprises a  
pair of rings which are adapted to clamp opposed faces of the annulus.
28. A system as in claim 27, wherein the device is adapted to clamp over  
and under a heart valve annulus.
29. A system comprising:  
a device as in claim 1; and

a visualization device adapted to directly view a valve annulus in a heart chamber.

30. A system as in claim 29, wherein the visualization device comprises an ultrasonic imaging transducer.

31. A system as in claim 29, wherein the visualization device comprises an optical viewing element disposed in a transparent element.

32. A system as in claim 31, wherein the optical viewing element is a fiber optic scope or a CCD and the transparent viewing element comprises a transparent balloon inflatable with a transparent inflation medium.

33. A system comprising:  
a device as in claim 16; and  
a visualization device adapted to directly view a valve annulus in a heart chamber.

34. A system as in claim 33, wherein the visualization device comprises an ultrasonic imaging transducer.

35. A system as in claim 33, wherein the visualization device comprises an optical viewing element disposed in a transparent element.

36. A system as in claim 34, wherein the optical viewing element is a fiber optic scope or a CCD and the transparent viewing element comprises a transparent balloon inflatable with a transparent inflation medium.